

Numerical analysis on countermeasures of bank erosion in the Sesayap River

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Bank protection structure is applied generally as a countermeasure of the bank erosion problem. The structures, such as groynes, revetments and so on, will success to protect the riverbank locally. However, usually the structures will change the cross-sectional geometry, which lead to change the flow pattern or others hydraulics parameters. In an extreme case, the structure will produce another bank erosion problem in another place, especially in case that the flow is a dominant factor in riverbank erosion problem.

In Sesayap River East Kalimantan Indonesia, the presence of a huge mid-channel bar accelerates the erosion by flows. The flow that deflected around the bars is a primary cause of bank erosion problem. To control the flow by dredging of the bars may give the significant result in a countermeasure the riverbank erosion.

In case of riverbank erosion with the mass failure process, the bed deformation near the bank is one of the input parameter to calculate the bank stability. The increase in relative height of riverbank that caused by bed scour has a strong influence on the stability of riverbank. So, the bed degradation near the riverbank is one of the important data on bank stability analysis. Therefore, an analysis of bed deformation near the bank with accurate calculation is needed.

A numerical model in horizontal two-dimensional flow averaged with depth is developed. To get the more accurate results on bed deformation, the grain size distribution of river bed is considered and will be evaluated using the sediment transport multilayer model. Case simulations are divided into four

conditions as shown in **Fig. 1** and the bed degradations near the bank are discussed.

Fig. 1a shows the simulation in existing condition. Bank protection structure such as revetment is applied as a method to countermeasures of bank erosion as shown in **Fig. 1b**.

Fig. 1b shows that the bed degradations near the bank toe are not improved well by the presence of bank protection structure. The dredging of the mid-channel bar can decrease the bed degradation near the bank toe significantly (**Fig.1c**). It seems that the dominant factor in the bank erosion is the presence of the mid-channel bar. Combination of dredging and revetment may give the best condition (**Fig.1d**). But considering the cost of revetment structure, the revetment is unnecessary in this case.

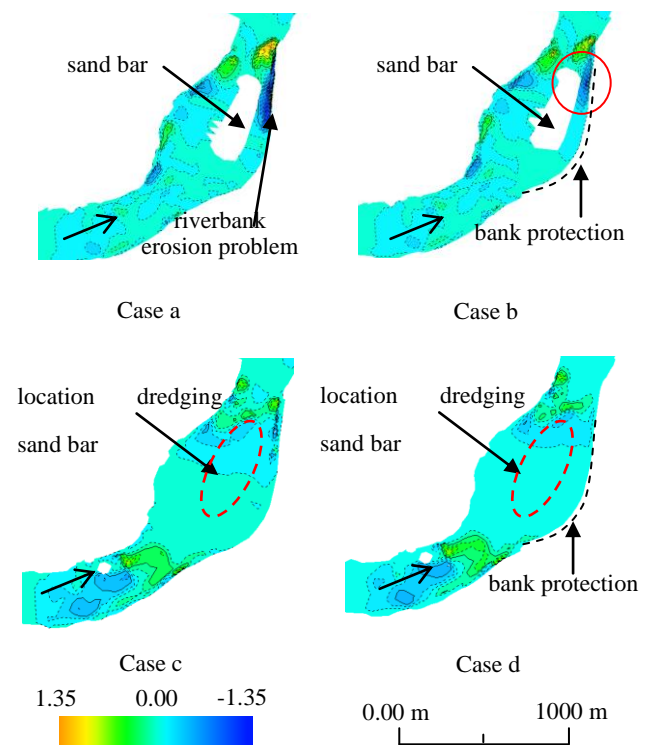


Fig. 1 Contour of bed elevation change